

# Design of power generation and energy storage device for road speed bumps

Can speed bumps generate power?

This study explores the practicality of power generation from road speed bumps by harvesting the energy of moving vehicles using a mechanical speed bump design with rack-and-pinion mechanism and spring system. It includes design analysis and prototype fabrication.

What is Speed Bump based mechanical energy harvesting?

Based on the existing techniques for energy harvesting, in this paper, we proposed a novel speed bump based mechanical energy harvesting (MEH) mechanism capable of generating electrical power not only in the loaded but also restoration modes. The objective of the proposed MEH system is given as;

Can a traffic energy-harvesting device harvest vehicle energy when passing over a speed bump?

A traffic energy-harvesting device (TEHD) is capable of harvesting vehicle energy when passing over a speed bump. This paper presents a classification of the different technologies used in existing TEHDs. Moreover, an estimation of the energy that could be harvested with the different technologies and their cost has been elaborated.

What is a movable semi-circular Speed Bump?

A movable semi-circular speed bump collects the waste kinetic energy of the traffic moving on the road. Hence, the electrical equipment installed on or beside the road can be powered by MEH. When a car runs over a speed bump, it is displaced downward by the weight of the vehicle.

Can piezoelectric power generation device be used in road traffic environment?

This paper presents a design scheme for the applicability of piezoelectric power generation device in road traffic environment, which overcomes the problem of limited application due to the existing technology inapplicability to the complicated and changeable road traffic environment.

How is a speed bump based MEH prototype made?

**Fabrication and assembly** The fabrication and assembly of the speed bump based MEH prototype is shown in Fig. 7. The semi-circular shaped bump profile is fabricated from a piece of metallic sheet, which is passed through a rolling press and then welded, to obtain the requisite shape.

power generation. Road Power Generation (RGP) is one of the most recent power generation concepts. This device is engineered as a practical and useful alternative energy technology for generating clean electricity from the millions of vehicles on our roadways. We every day mesh up with these vehicles give us headache. But this mesh up could be

Based on the property of turning linear motion into rotational motion, we constructed a 3D MAX model of the speed bump plate-driven power generator device ...

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Road-compatible piezoelectric energy harvesters (RPEHs) have recently been widely demonstrated to power traffic ancillary facilities and intelligent sensing devices. The output power of RPEHs was ...

This study explores the practicality of power generation from road speed bumps by harvesting the energy of moving vehicles using a mechanical ...

An energy harvesting system for road speed bumps was proposed, which consists of a piezoelectric impact-induced vibration cantilever energy harvester and a low-power power management...

Researchers have carried out a series of studies on the application of road piezoelectric technology, such as epoxy resin packaging structures based on PZT-5H and PVDF piezoelectric composites for road crack monitoring [13], the piezoelectric power generation device for pavement composed of plywood and piezoelectric energy harvesters [14], the piezoelectric ...

Similar to the concept of Zero Energy Tunnels [13], the idea of expressway near-zero-energy toll stations is proposed in order to utilize the kinetic energy wasted when the vehicle speed is decreased at toll stations. The output power can be used for electronic devices around expressway near-zero-energy toll stations, such as LED displays, warning lights and pressure ...

[1] Heo D, Chung J, Kim B, Yong H and Shin G 2020 Triboelectric speed bump as a self-powered automobile warning and velocity sensor Nano Energy 289 104719 Go to reference in article Google Scholar [2] Syam B, Muttaqin M and Hastrino D 2017 IOP Conference Series: Materials Science and Engineering (IOP Publishing) Analysis of power generating speed ...

explores the feasibility, mechanisms, and potential of power generation through speed breakers. Feasibility: Energy Source: Vehicles dissipate significant kinetic energy while crossing speed bumps, creating a readily available but untapped source of renewable energy. Studies suggest that a single busy highway

An energy harvesting system for road speed bumps was proposed, which consists of a piezoelectric impact-induced vibration cantilever energy harvester and a low-power power management circuit.

techniques for the power generation and its storage. POWER HUMP is a dome like device likely to be speed breaker. Whenever the vehicle is allowed to pass over the dome it gets pressed downwards then the springs are attached to the dome is compressed and the rack which is attached to the bottom of the dome moves downward in

Innovative design of energy generation and storage devices based on road speed bumps ... In addition, the speed bumps have a sunken design that reduces vehicle bumps, while powering ...

## **Design of power generation and energy storage device for road speed bumps**

The construction cost for the road was approximately \$90,000 under laboratory conditions; assuming the service life of a road to be 15 years, a price of electricity of \$0.2/kWh and an average annual daily electricity generation of 100 kWh, the road could generate an annual income from electric power generation of about \$110,000.

The proposed system consists of a speed bump module, a transmission module, a generator module and an energy storage module. The speed bump module is installed on the road, and shares the same psychological warning effect as traditional speed bumps--that is to say, if a vehicle passes quickly, the driver and passengers will suffer severe ...

Road Power Generation (RPG) is a system design to capture wasted kinetic energy from all vehicles. This device converts the kinetic energy of the vehicles into electrical energy [2].

This study explores the practicability of a large-scale power generation from road speed bumps by harvesting moving vehicle energy using mechanical speed bump (MSB). It includes conceptual design of a large-scale speed bump power generation system (SBPGS), analysis of the power generating capacity, and techno-economic analysis of the system. The ...

The harvested energy is stored in a storage device, then analyzed by computer through the acquisition of the harvested voltage, current, power, and energy. ... power, and energy. The design problem has been formulated and ...

The maximum power output of 44.73 W and average power of 22.34 W was achieved at a mechanical efficiency of 69.19%. Chen et al. [1] introduced a cylinder piston based mechanical energy harvesting device that was installed on the road for ...

An adaptive CAD and CAE analysis - the importance of which is highlighted by Ho et al. [7] - has been undertaken to showcase the ability of the innovation to achieve its objectives. It proves to be a Green Energy project which can result in the highest ecological benefits as highlighted by Fatima and Mustafa [5] proves to be a sustainable way to produce energy ...

A lot of research has focused on energy harvesting speed bumps (EHSBs), electric ramps, and small wind harvesters. The conversion mechanism usually adopts rack and pinion mechanism [27][28][29][30 ...

Sustainable clean energy collection technology can provide long-term power for wireless sensing technology, may become a new energy supply technology to replace traditional batteries [1, 2], and its development and utilization have attracted extensive attention in the field of energy development road engineering, automobiles travel frequently, and the road structure ...

A traffic energy-harvesting device (TEHD) is capable of harvesting vehicle energy when passing over a speed

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bump. This paper presents a ...

It is very significant to design pollution free energy generation system. Speed breaker Power Generator (SBPG) is the most emerging technique which produces electrical power with minimum input.

Power generation from speed breaker (PGFSB) is a system design to capture waste and kinetic energy from all vehicles. This device converts the kinetic energy of the vehicles into electric energy. This is done by moving plate installed on the road, this plate captured very small movement from the road surfaces and it transferred to rack and ...

Today, solar energy and wind energy have significantly alternated fossil fuel with big ecological problems. With the development of the science and technology, power generation using solar energy and wind power is gradually ...

To realize the application of piezoelectric power generation pavements, we design a power generation device for pavements that integrates energy output and road coupling. The structure and size of the power generation device are optimized based on traffic load characteristics. The complete production and assembly process are established.

to small power generating units, and the produced energy can be used to power small devices for better road safety. The kinetic energy of moving vehicles can be transformed to mechanical energy by using various types of mechanisms, which can ultimately be converted to electrical energy through a generator.

Road Power Generation (RGP) is one of the recent power generation concepts to be used now a days. It is one of the alternative and most recent concept used. Once fully installed, engineers say that devices may be used to replace conventional electrical supplies for powering roadway signs, street and building lights, storage systems for

Design of Power Generation Unit Using Roller Mechanism B. Santosh Sarma<sup>1</sup>, V. Jyothi<sup>2</sup>, ... proper alternative energy [1]. Unlike conventional speed bumps, the roller mechanism set up won't damage the ... be used to power road signs, traffic lights and street lights or stored in batteries for future use. The track is made

Impeller of the electromagnetic generator is rotated by the high-speed flow of fluid, thereby generating electrical energy that can be stored in super capacity. Compact design is adapted ...

Recently the technology development and increasing amounts of investment in renewables has led to a growing interest towards design and optimization of green energy systems. In this context, advanced ...

A.Padam Rao, "Power generation from speed breaker by rack and ratchet method", International Journal of Current Engineering and Technology Issue-2, February, 2014. [5] 6.

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## Battery String-S224

- 1C Charge/Discharge
- Easy configuration and maintenance
- Power supply can be single battery string or parallel battery strings